GEOGRAPHICAL RECORD

AMERICA

STUDY OF SHORELINE CHANGES ALONG THE ATLANTIC COAST. Prof. D. W. Johnson of Harvard, and assistants, is making a study of shoreline changes along the Atlantic Coast this year. The most important localities from the Bay of Fundy to Southern Florida will be examined during the spring and early summer. Special attention will be given to changes in the form of beaches within recent geological time and to supposed evidences of recent coastal subsidence. As the problem of coastal subsidence is affected by the relative heights of high tides on the outer and inner sides of barrier beaches, lines of levels will be run between the ocean and lagoons upon which tidal observations will be based. During the latter part of the summer, Prof. Johnson will visit places on the coast of England, Holland and Sweden to make comparisons with similar localities on the Atlantic coast of North America. The work will be the second Shaler Memorial Research supported by the Shaler Memorial Fund of Harvard University.

A GREAT ARC OF PRIMARY TRIANGULATION (TEXAS-CALIFORNIA). The Coast and Geodetic Survey has just completed a great arc of primary triangulation more than 1,200 miles in length, extending from central Texas to the Pacific coast. It connects the 98th meridian primary triangulation in the vicinity of Weatherford, Texas, with the Pacific coast primary triangulation in the vicinity of San Diego, Cal.

It is connected with the United States and Mexican boundary at a number of places and is joined to and correlates a number of detached government surveys. It furnishes the geographic positions on the U. S. Standard Datum, of more than 200 points which can be used to control all future public surveys within the region traversed.

There are 92 primary stations in the main scheme of this triangulation and, in addition, 38 stations in secondary schemes which provide for the connections with United States-Mexican boundary monuments and existing triangulation. The total area covered by the triangulation is 48,400 square miles, the average length of line east of El Paso is 17 miles, and from that place to the Pacific coast it is 62 miles. The maximum length of line is about 120 miles. The observations were made with a 12-inch theodolite, the pointings being made on heliotropes and acetylene lamps mounted at the stations observed upon. During the progress of the triangulation two primary bases were measured and 24 primary azimuths were observed.

The reconnaissance for this work was made between September, 1907, and February, 1908, and the observing was done in three seasons between November, 1908, and February, 1911. The total work was done in less than three years and six months, and the observations in less than two years and four months.

While the Coast and Geodetic Survey has, in the past, made more rapid progress on primary triangulation in the United States than that made in any other country, yet the rate of progress on the Texas-California arc exceeds that

on any other arc in this country and the unit costs per square mile of area covered by the main scheme and per mile of progress are only about one half those of the triangulation between Marysville, Cal., and Tacoma, Wash., the arc for which, previously, these unit costs were the lowest. The accuracy, as measured by the closing errors of triangles of the Texas-California arc, is greater than that specified in the requirements for such work.

The remarkable rapidity of progress and the low cost of the work were largely due to the small amount of camp equipage used by each unit of the party; to the fact that only two officers had charge of field work, Mr. William Bowie, Inspector of Geodetic Work in the Coast and Geodetic Survey, on reconnaissance and a portion of the first season's observing, and Mr. J. S. Hill on the remainder of that season's work and that of the succeeding two seasons; and to the services of a most efficient signalman, Mr. J. S. Bilby, who was attached to each party from the beginning of the reconnaissance to the end of the observing. The parties were organized and managed, in the main, in a manner similar to that of the parties engaged on other pieces of primary triangulation done by this survey in recent years, only such changes being made as were necessary to meet new conditions which were encountered in semi-arid and arid sections, much of which was also mountainous.

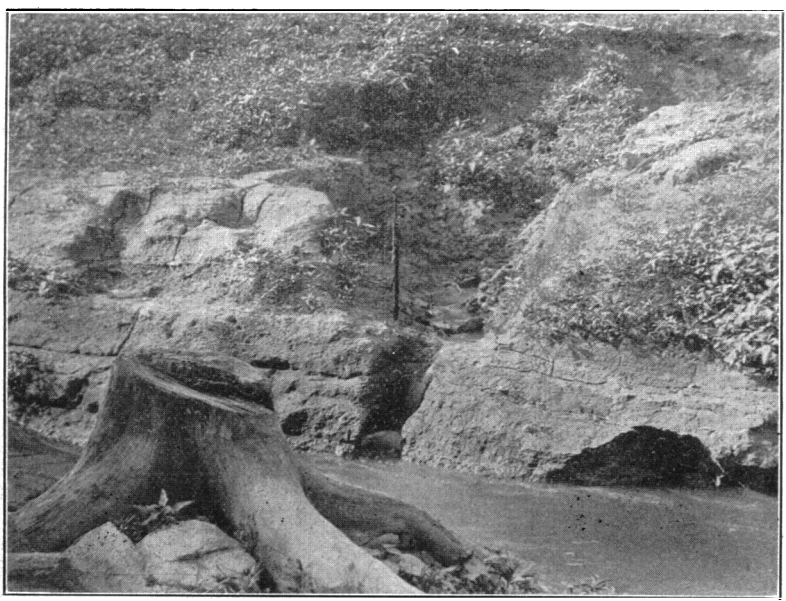
This arc of primary triangulation will not necessarily be discussed separately by this survey in investigations of the figure of the earth, as were the two great arcs, one extending across the continent along the 39th parallel of latitude and the other paralleling the Atlantic coast from Maine to the Gulf, and known, respectively, as the "transcontinental arc" and the "oblique arc." In the last two publications by the Coast and Geodetic Survey on investigations of the figure of the earth (entitled, "The Figure of the Earth and Isostasy from Measurements in the United States" and "A Supplementary Investigation in 1909 of the Figure of the Earth and Isostasy") the method was adopted of using the entire connected network of triangulation.—(WILLIAM BOWIE, in *Science,* April 7, 1911.)

GLACIAL STUDIES IN ALASKA. The Research Committee of the National Geographic Society of Washington has made an appropriation of $5,000 for continuing the glacier studies of the two previous years in Alaska. The work, beginning in June, 1911, will be done by Professor R. S. Tarr of Cornell University and Professor Lawrence Martin of the University of Wisconsin, who directed the National Geographic Society's Alaskan Expeditions of 1909 and 1910, in the Yakutat Bay, Prince William Sound, and lower Copper River regions. The 1911 expedition will study briefly a number of regions of glaciers not previously investigated by that Society, although partially mapped by the Alaska Division of the U. S. Geological Survey, the Boundary Commissions, etc. Work will be done on the present ice tongues and the results of glaciation in the mountains and plateaus of parts of the interior and some of the fiords of southeastern Alaska, the former having lighter rainfall and smaller ice tongues than the Yakutat Bay and Prince William Sound regions.

RAINFALL OF PORTO RICO. The *"Average Annual Rainfall of Porto Rico, W. I.,"* is the subject of a paper by Dr. Oliver L. Fassig, in the November (1909) number of the *Monthly Weather Review.* This is a preliminary report, a complete discussion of the climate of Porto Rico being promised in the future. The geographical distribution of the rainfall is shown by seasonal and annual charts. For the whole island the mean annual is 77 inches; varying from 37

inches along the south coast—an area devoted largely to the cultivation of sugar cane—to a maximum of 136 inches on the eastern slope of the Luquillo Mts. in the northeast portion of the island. From this area of heavy precipitation a number of streams flow down, to water the coffee and sugar plantations of the surrounding country. Along the north coast, where the citrus fruits and pineapples grow, the average fall is about 65 inches. The rainfall on the north side of the island is greater in amount, and more advantageously distributed throughout the year, than that on the south side. On the latter, periods of four or five weeks with little or no rain are of frequent occurrence, and periods of two or three months with less than an inch of rain are not uncommon. Irrigation works are now being planned in this southern area. At present, it costs planters from $25 to $50 an acre per year to pump ground-water for irrigating their cane fields. There are no well-defined wet and dry seasons. The winter rains are comparatively light, with a mimimum in February. There is a steady increase in rainfall from February through May. October gives the maximum for the island as a whole. For the island as a whole, autumn has 26 inches; summer, 23 inches; spring, 16 inches; winter, 11 inches. R. DEC. WARD.

A SMALL HANGING VALLEY. In view of the many recent discussions in regard to hanging valleys, the accompanying photograph may be of interest. It shows a very interesting, though miniature, hanging valley developed along a



small stream at the time of the draining of an old mill pond. The picture was taken along Cobb's Creek between Bryn Mawr and Philadelphia in late spring. During the winter or spring the old dam forming the pond had broken away and, when first seen, the stream had cut its way down to grade through the eight or ten feet of silt which filled the pond. The stump shown in the foreground of the picture was laid bare by stream erosion after having been long

buried under the covering of silt. It undoubtedly represents a tree that had been growing on the floodplain of the stream before the time of the building of the dam, possibly 75 or 100 years ago.

The small entering side stream shown in the center of the picture has been unable to cut down its valley to the level of the master stream and thus enters the main stream over a waterfall about 18 inches high. The hanging valley thus formed above the fall is open,—a wide U-shaped trough. The crest of this fall seems to be determined by a slightly more resistant layer of clayey silt. The tributary stream, though small, is constant in its flow,—not simply a wet weather rivulet. Developed on a small scale and in unconsolidated material and in the course of normal stream erosion, this hanging valley nevertheless strikingly resembles many of the large ones, even those developed by glaciation, which have come under the observation of the writer.

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ASIA

DR. STEIN'S MAPS. Besides the vast store of archæological information which Dr. Aurel Stein brought back from Chinese Turkestan and Western Kansu, he and his assistants from the Survey of India carried out a very large amount of careful topographical surveying, which very greatly improves the maps of that region. Plane table surveys were carried on continuously during the journeys, and these were controlled by astronomical observations for latitude made at 72 stations, and by others made during a previous journey in 1900-1. From this material ninety-four sheets are being prepared by the Survey of India on the scale of 1:253,440, and will be published in the form of an atlas to accompany the detailed report on the scientific results of Dr. Stein's last journey. In the meantime reduced copies have been published by the Royal Geographical Society in the *Journal* for March. The whole area from Kashgar to Kan-Chou (Long. 75°-101°), including the Takla Makan desert and the mountains bounding it, is plotted on the scale of 1:3,000,000. Other maps on the scale of 1:1,000,000 show the Kun-Lun range on the frontier of Kashmir, and Western and Central Nan-Shan to the eastward. On all these maps, heights which have been determined by triangulation, or by barometric or clinometric observations, are shown, names have been carefully revised, and the areas occupied by cultivation, scrub or jungle, and desert have been distinguished. The whole forms a most valuable addition to Asiatic cartography. (*Nature,* April 20, 1911.)

EUROPE

COMPLETION OF THE MAP OF THE GERMAN EMPIRE IN 1:100,000. In view of the long existence and accurate topographic surveys in Germany it was somewhat surprising to learn (*Geogr. Zeitschr.,* Feb., 1911, pp. 102-104) that the standard topographic map of the country, which bears the above title, was completed only last year. This is due to the fact that prior to the foundation of the Empire no map existed representing the entire country on the same scale. In 1878 the topographic survey bureaus of Prussia, Bavaria, Saxony and Württemberg drew up an agreement whereby the preparation of the map was apportioned among them according to the respective size of the territories under their military jurisdiction. Of the total number of 675 sheets, each measuring 30′ in longitude and 15′ in latitude, Prussia thus undertook to complete 545, Bavaria 80, Saxony 30 and Württemberg 20. When the great amount of detail

and the painstaking execution of the map are taken into consideration, together with the fact that some original and continual revisional surveys have been necessary for its preparation, the time elapsed does not seem unduly long.

The map is too well known among students of the standard topographic maps of the world to require comment. It may be of interest to note, however, that before its completion a new edition, in three colors, on the scale of 1:200,000 has been begun on which relief is represented by contours in brown, resulting in a map far more legible and pleasing than the original, printed in one color, with its hachures in black.

STUDENTS' GEOGRAPHICAL ASSOCIATION. In January an association of the students of geography at the University of Leipzig was founded with the object of promoting interest in geography among the students in general and of aiding in their work students of geography in particular. Papers are presented on geographic topics, followed by discussions, and excursions and informal gatherings bring the members into closer contact with each other. (*Geogr. Zeitschr.*, Feb., 1911.)

POLAR

DR. NANSEN EXPLAINS AMUNDSEN'S ADVENT IN THE ANTARCTIC. Much surprise was expressed when it was announced that Capt. Amundsen, instead of carrying out his plan of going to the Arctic Ocean through Bering Strait for a five years' drift across the polar area, had decided to enter the Antarctic field. His change of plan is now explained by a letter from Dr. Nansen, published in the London *Times* (weekly edition, April 28, 1911), in which he includes the long letter that Amundsen sent to him from Madeira.

It appears that when news arrived in the autumn of 1909 of the journeys of Cook and Peary in the Arctic regions, Amundsen felt certain that he would not be able to raise all the money required for his Arctic project. This conclusion was later justified by events, for he found himself unable to obtain the balance of the money, about $40,000, which he needed for the long Arctio enterprise he was contemplating. He saw that he would have to change his plans and he decided to go to the Antarctic and to attempt to reach the South Pole, which, he believed, was the only phase of exploration left to him that might reawaken public interest and bring him the money he needed. He did not tell his plan to Nansen or other friends, fearing that they would try to dissuade him. He thought himself sufficiently equipped, however, to make a dash for the South Pole, and he announced his change of plan in his letter to Nansen from Madeira.

Dr. Nansen calls attention to the fact that the bases of operations of Scott and Amundsen lie far apart, there being about the same distance between them as between Spitzbergen and Franz Josef Land. Nansen concludes:

"It is beyond doubt that such an excellent explorer as Capt. Scott, with his carefully equipped expedition, will return with results of very high scientific value; but, on the other hand, Capt. Amundsen, by journeying through another region, will most certainly bring back valuable information of unknown tracts quite independent of Scott. I therefore think that students of polar problems have great reason to rejoice that two such eminent explorers are at work simultaneously in the south, as their discoveries and observations will supplement each other and the value of each will thus be greatly increased."

AN EXPEDITION TO JAN MAYEN. The Society is informed that Mr. J. Foster Stackhouse of England has organized an expedition to visit, in the coming

summer, Jan Mayen, northeast of Iceland in the Greenland Sea. The purpose is to chart the waters around the island and to make observations on land. Mr. W. S. C. Russell, Director of the Science Department of the Central High School, Springfield, Mass., has been invited to take the geological work in charge. His purpose is to make a study of the glaciers and ascertain the present condition of the two volcanoes Esk and Beerenberg. He will sail from Boston on June 23, to join the English party at Newcastle. Other members of the expedition will be an ornithologist from Sweden, an oceanographer who was with Scott in the Antarctic and Baron Klinckowström, of Stockholm, who was on the Belgica relief expedition and has done good work in Spitzbergen. The party expects to call at the little island of Mevenlint, almost unknown on the charts, and run a line of soundings around it.

EDUCATIONAL GEOGRAPHY

MAP STUDY IN SCHOOLS. The study of the map and its practical use should receive greater emphasis. The interpretation of geographic relations from a clear wall map will yield results that few teachers appreciate. Pupils should acquire the knack of rapidly sketching memory maps which illustrate certain definite features. No time should be given to the tracing of the detailed features of an irregular shoreline nor devoted to outlining a continent by an elaborate system of longitude and latitude. Blank maps for each pupil are essential in the distribution and progressive studies of climate, surface and commercial relations. Large blank wall maps are valuable in the class discussion of the resources, relief, drainage and any data that the teacher can readily plot thereon. Elementary geography in this country needs wall maps, charts and diagrams that are simple and clear in their delineated features and adapted to the capacity of the pupil. The American Geographical Society has given a distinct service to education in its traveling exhibit of foreign maps, and there remains a similar duty in a compilation of the Amercan published maps accompanied by a statement of merits, defects and details of price, publisher, mounting, editions, etc.

The places to locate are more numerous now, but some phases of modern geography are of greater value to the child than mere mechanical location exercises. The plea, for such mnemonic work, indicates a serious neglect of the atlas and the map in the elementary school and a disregard of their habitual use. Why not be as sensible in the use of the map and the atlas as the dictionary? Let the teacher realize that work is half done when the history and the reading classes are conducted without the use of the map.

The necessity of illustrative material in geography is widely recognized by educational authorities. The modern texts have a generous assortment of pictures and maps, but the school equipment of globes, wall maps, charts, pictures, specimens, products and lantern slides is extremely scant in the elementary schools of the large cities. In one large city the cost of the geographical equipment in a single high school exceeds the total value of all the maps and the materials for the teaching of geography in one hundred elementary school buildings.—From "Present Problems in Elementary School Geography," by W. M. Gregory, *Journ. of Geogr.*, Vol. IX, No. 7, 1911.

INSTRUCTION IN METEOROLOGY. The last ten years have brought a very marked advance, and also a most effective improvement, in meteorological instruction in our schools and colleges. Anyone who will take the pains to

compare the geographical texts of a dozen or so years ago with the more recent volumes can easily convince himself of this fact. This is a most encouraging sign, for there are few studies which are better adapted for training in habits of system, accuracy and punctuality, and not one which contributes more, in the long run, to make daily life interesting. The atmosphere we cannot escape from. The physical experiments—for they are obviously physical experiments on a large scale—which go on in the atmosphere, are constantly brought to our notice. We cannot, if we would, fail to have our attention drawn daily, almost hourly, to the weather phenomena which, in a fairly regular yet never monotonous succession, are constantly recurring.

The text-book,"Manual of Physical Geography," by Dr. F. V. Emerson, of the University of Missouri (reviewed in Bulletin, Vol. 42, 1910, pp. 299-300), gives about 40 pages to a few well-chosen exercises on meteorology and climate. These, it is to be noted, are placed very near the beginning of the book, where they properly belong, instead of being tucked away as if they were an afterthought, in a less conspicuous place. The exercises cover insolation, a subject which, we agree with the author in thinking, is generally neglected, but of fundamental importance; annual and diurnal march of temperature; the effect of oceans and continents and of altitude upon temperature; relative humidity, and its hourly and monthly variations; rainfall; studies of cyclones and anticyclones; and miscellaneous climatic phenomena, such as land and sea breezes, chinook winds, dew, fog, clouds, frost, sailing routes, etc. Clearly, the number of topics here touched upon is so large that only a very brief study can be made of most of them. Nevertheless, the teacher who takes an interest in this side of geography can extend the work along the suggested lines, and by so doing will be able to frame a consistent and satisfactory course of instruction.

R. DeC. Ward.

Geographical Equipment of the Cleveland Normal School. The Department of Geography in the Normal School, Cleveland, Ohio, is designed to provide convenient facilities for the training of students to teach elementary school geography. The rooms devoted to this subject are on the second floor of the new building which is located south of University Circle and fronts to the east on Ambler Park.

The space given to geography is divided into a lecture room, laboratory, exhibit room, office, storage room and a small dark room. The lecture room has a raised platform upon which there is a demonstration desk with ample space for the class display of experiments, pictures, materials, etc. The projection apparatus and lantern slide cabinet is placed at one side of the demonstration desk and so arranged that it may easily be operated by the instructor. A blank wall space to the front and side of the room serves for the projection surface. The lecture room has blackboard space and two sliding map racks for the display of wall maps and charts.

The laboratory is a large well lighted room which has been arranged for the first hand study of various geographical materials and affords an opportunity for the student to prepare simple and effective teaching devices, i. e., charts, produce maps, modeling materials, local plans, outline maps, diagrams, collections of raw materials and pictures. At the front of the room is a large demonstration table provided with gas, water and numerous storage drawers. The eight large work tables have individual lockers and accommodate four students each. The tables are flat topped and are fitted with detachable map

racks. Large sliding map racks at the front of the room supply display space for maps, charts and diagrams. A lead lined modeling table, fitted with storage bins for clay, sand and shelves for modeling boards, occupies one corner of the laboratory. There is an exposure shelter for meteorological instruments.

The small exhibit room is designed to display geographical materials and objects for inspection and study by students. The side walls of this room are fitted with display cases which have slanting shelves. In the center of the room is a special exhibit case with plate glass top and fitted with four tiers of interchangeable drawers which serve for the storage and display of material.

The storage room has a map case with the upper three compartments for rolled maps, while the lower four cupboards and three drawers are for flat maps, charts and supplies. In the storage room there is an additional case for supplies and a small work bench. The dark room is provided with gas, electricity and water on the developing bench and wall cases for materials. The office which is between the lecture room and the laboratory is provided with desk, filing cases and ample book cases for a departmental library.

W. M. Gregory,
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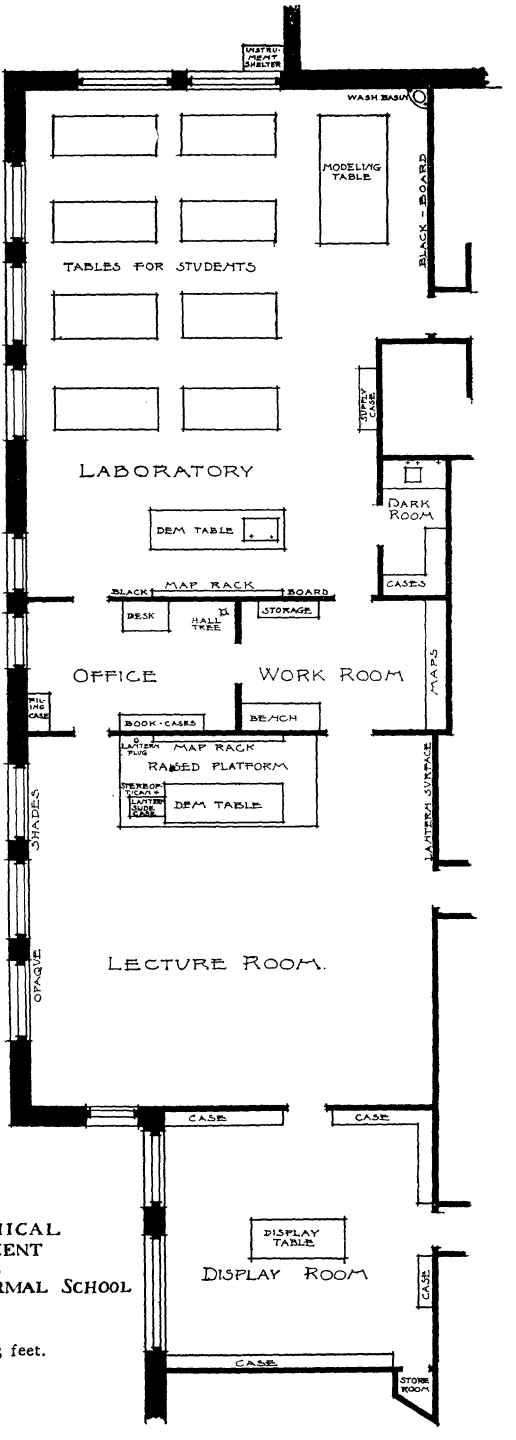

GEOGRAPHICAL
DEPARTMENT
OF THE
CLEVELAND NORMAL SCHOOL

Scale
1 inch = 15 feet.